

NO DRAWINGS

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(54) THERMOADHESIVE MATERIALS

'71 We, A. MUSSERLI A.G., a Swiss Company of Lavaterstrasse 61, Zurich, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to thermoadhesive photocopy paper, its production and its use 10 for copying patterns and cutting diagrams in the clothing industry.

Photocopy papers which are used in the clothing industry by being stuck onto the textile material generally consist of a carrier sheet which carries on one side a light sensitive diazotype layer and on the other side an adhesive layer. The photocopy paper used for copying cutting diagrams in the ready-made clothing industry carries an adhesive layer which allows the copy of the cutting diagrams to be stuck onto the uppermost layer of material with the aid of heat. After the cutting out operation is completed, the paper can be separated from the material without leaving any residue.

In the manufacture of cutting diagrams the photocopy paper is exposed through a pattern or transparent cutting master drawing, and then developed. The development 30 may be effected using a liquid developer or with ammonia vapour. The exposed and developed cutting diagrams show after this process a positive image; they are stuck in position on the material by ironing.

Cutting diagrams so made have various disadvantages. First, the process for their manufacture involves the step of development for which a special development apparatus is necessary. Sometimes vapours (of ammonia) are needed for this process, which are injurious to health. Further, distortion 40 of the paper during development cannot be avoided, so that exact agreement between the copy and the original may not be achieved.

It is an object of the present invention to provide a photocopy paper by means of which a simplification of the working process is made possible, by avoiding the developing process and thereby decreasing the

amount of apparatus necessary, but by means of which a closer agreement of size between the original and the copy is obtained.

According to the present invention there is provided a thermoadhesive photocopy material which comprises a support sheet carrying on one side a light sensitive layer which contains an inorganic salt or a mixture of inorganic salts which in the presence of divalent iron gives a characteristic colouring, and at least one salt of trivalent iron, which on exposure is converted to divalent iron, and on the other side a thermoadhesive layer. The support sheet is preferably a paper sheet and accordingly the product is referred to herein as thermoadhesive photocopy paper. However, other sheet materials may be used. Preferably, the light-sensitive layer contains potassium ferricyanide and ferric ammonium oxalate and/or citrate.

Preferred embodiments of the photocopy paper according to the invention are those in which the light sensitive layer additionally contains at least one organic acid which forms soluble complex salts with iron, especially citric or oxalic acid. Additionally, the light-sensitive layer also preferably contains at least one oxidising agent, preferably ammonium bichromate or potassium chromate, generally in an amount of up to 10%, preferably 1.5—2.5% of the weight of the trivalent iron, pigments (e.g. ochre), and binding agent (e.g. gum arabic).

According to a particularly preferred embodiment of the invention thermoadhesive photocopy paper carries on one side a light sensitive layer which contains iron ammonium oxalate, iron ammonium citrate and potassium ferricyanide in a molar ratio of 26—30: 47—58: 16—21, especially in a molar ratio of about 30:50:20, and on the other side a thermoadhesive layer consisting of polyethylene.

The total amount of solids in the light sensitive layer is preferably between 1.5 and 2.5 grams per square metre. However, the layer can also contain more or less solids, according to the particular use for which

the paper is designed, the type of paper carrier used, the composition of the light sensitive mixture, the intended degree of light sensitivity and the intended stability of 5 copies.

The weight of the thermoadhesive layer is preferably between 5 and 20 grams per square metre, especially between 8 and 10 grams per square metre; however, the weight 10 of the layer can also be higher or lower, according to the type of material acting as thermoadhesive or the type of material to which the copies are to be adhered.

The application of the light sensitive layer 15 and the thermoadhesive layer can be carried out by any conventional coating procedures. Preferably the application of the light sensitive layer is effected by applying the light sensitive mixture in the form of a solution, preferably an aqueous solution, onto the paper.

As support material for the photocopy paper according to the invention there can be used any suitable commercial paper which 25 has sufficient mechanical stability and sufficient chemical resistance to ensure that it does not deteriorate during manufacture and storage of the paper, and does not tear during use. Preferably a paper is used of 30 weight 30—120 grams per square metre, especially 50—70 grams per square metre.

The thermoadhesive photocopy paper according to the invention may be put to use as follows: the original to be copied, for 35 example a pattern, is laid on the photocopy paper and the paper is then exposed *via* the original. The intensity and time of the exposure depend on the contrast desired and the desired stability of the copy. Conventional copying apparatus may be used. Preferably U.V. light or light with a high proportion of U.V. is used. On exposure, there results immediately on the photocopy paper a copy of the pattern. This copy can be 45 used at once.

For example, the copy of a pattern can be laid with the thermoadhesive layer on a workpiece to be operated on, and adhered thereto by the application of heat. At the 50 end of the operation, the paper can be easily removed again from the workpiece, without leaving any residue behind.

A preferred area of use of the photocopy paper according to the invention is in the ready made clothing industry for the copying of cutting diagrams. Therein, the patterns or transparent cutting master drawings are laid on the photocopy paper and covered with transparent plates, which 55 should be as transparent to U.V. radiation as possible, in order to obtain a close contact during the subsequent exposure and thereby a high line definition. After exposure, the copy of the cutting diagram can 60 be ironed on to the uppermost material 65

layer, and allowed to remain stuck thereto throughout the whole working procedure. The paper can be removed after cutting out without leaving a residue, which is especially advantageous in this connection.

Further advantages of the photocopy paper according to the invention consist especially in that the cutting diagram appears immediately after exposure (negative), and that no development of the paper image is necessary as in diazotype papers. The important advantage of the avoidance of development lies in that as well as the saving in operating time, no distortion of the paper can take place (commonly a result of damp development), and that the use of vapours harmful to health, for example ammonia, is avoided. This gives a further simplification and saving, since the provision of a suction removal apparatus for the ammonia is not necessary.

The following Example will serve to illustrate the invention:—

EXAMPLE

A cellulose paper, bleached, wood free and gloss on one side, of weight 60 grams per square metre was coated on the gloss side with polyethylene so that the weight of the layer amounted to 10 grams per square metre. ("Perlathen" of Papierfabrik Perlen, Lucerne, Switzerland). Onto the uncoated reverse side of the paper was applied a solution which had the following composition:

Ammonium bichromate	20.0 g	90
Ferric ammonium oxalate	500.0 g	100
Potassium chromate	10.0 g	
Ferric ammonium citrate	1000.0 g	
Ochre	50.0 g	
Citric acid	250.0 g	
Oxalic acid	200.0 g	105
Gum arabic	100.0 g	
Potassium ferricyanide	250.0 g	
Water	to make 17 litres	

WHAT WE CLAIM IS:—

1. A thermoadhesive photocopy material which comprises a support sheet carrying on one side a light sensitive layer which contains one or more inorganic salts which on reaction with divalent iron becomes coloured, and at least one salt of trivalent iron which on exposure is converted to divalent iron, and on the other side a thermoadhesive layer.

2. Thermoadhesive photocopy material according to claim 1 wherein the light sensitive layer contains potassium ferricyanide and ferric ammonium oxalate and/or ferric ammonium citrate.

3. Thermoadhesive photocopy material according to claim 2 wherein the light sensitive layer contains ferric ammonium oxal-

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 ate, ferric ammonium citrate and potassium ferricyanide in a molar ratio of 26—33 to 47—58 to 16—21.
 4. Thermoadhesive photocopy material according to claim 3 wherein the said molar ratio is substantially 30;50:20.
 5. Thermoadhesive photocopy material according to any of claims 1—4 wherein the light sensitive layer contains at least one organic acid, which forms soluble complex salts with iron.
 6. Thermoadhesive photocopy material according to claim 5 wherein the acid is citric acid or oxalic acid.
 15 7. Thermoadhesive photocopy material according to any of claims 1—5 wherein the light sensitive layer contains at least one oxidising agent in a quantity of up to 10% of the weight of the salt of trivalent iron.
 20 8. Thermoadhesive photocopy material according to claim 7 wherein the said quantity is 1.5 to 2.5%.
 25 9. Thermoadhesive photocopy material according to claim 7 or 8 wherein the oxidising agent is ammonium bichromate or potassium chromate.
 10. Thermoadhesive photocopy material according to any of claims 1—9 wherein the light sensitive layer contains a pigment and/or a binding agent.
 30 11. Thermoadhesive photocopy material according to any of claims 1—10 wherein the thermoadhesive layer consists of polyethylene.
 35 12. Thermoadhesive photocopy material according to any of claims 1—11 wherein the support sheet is paper.
 40 13. A process for the manufacture of the thermoadhesive photocopy material according to claim 1 in which a support sheet is coated on one side with a light-sensitive mixture which contains at least one inorganic salt which on reaction with divalent iron be-
- comes coloured and at least one salt of trivalent iron which on exposure is converted to divalent iron, and is coated on the other side with a material which on heating acts as an adhesive. 45
 14. A process according to claim 13 wherein the light sensitive mixture is applied to the paper in the form of an aqueous solution. 50
 15. A process according to claim 13 or 14 wherein the light sensitive mixture contains potassium ferricyanide and ferric ammonium oxalate and/or citrate. 55
 16. A process according to claim 15 wherein the light sensitive mixture contains ferric ammonium oxalate, ferric ammonium citrate and potassium ferricyanide in a molar proportion of 26—33 to 47—58 to 16—21. 60
 17. A process according to any of claims 13—16 wherein the light sensitive mixture contains at least one organic acid which forms soluble complex salts with iron. 65
 18. A process according to any of claims 13—17 wherein the light sensitive mixture contains at least one oxidising agent in an amount of up to 10%, of the weight of the salt of trivalent iron. 70
 19. A process according to any of claims 13—18 wherein the light sensitive layer contains pigment and/or binding agent.
 20. Thermoadhesive photocopy paper according to claim 1 when used for the copying of patterns and cutting diagrams. 75
 21. A thermoadhesive photocopy paper substantially as described with reference to the foregoing specific Example.

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